TRANSACTIONS

OF THE

Royal Society of Victoria.

Anniversary Address of the President,

MR. R. L. J. ELLERY, F.R.A.S., Government Astronomer.

[Delivered to the Members of the Royal Society, at the Anniversary Meeting, held on the 26th March, 1868.

GENTLEMEN OF THE ROYAL SOCIETY OF VICTORIA,

For the third time it devolves upon me, as your President, to deliver the Annual Address, on this occasion inaugurating our thirteenth session.

The honour you have thus conferred upon me was, I confess, an unexpected one; I beg however to assure you most earnestly, that I am fully sensible of the distinction implied in your trust, and no less of the responsibility which it entails.

On similar occasions it has been our custom to review the Society's operations during the previous session, touching also on the scientific progress of our public scientific institutions during the past year. Adopting our usual plan, I now propose to briefly review, first, the contributions laid before you at your various meetings during your last session, following this by a general survey of the year's history of our scientific departments, and concluding with a brief notice of one or two of the more salient points of scientific discovery belonging to the year 1867; for the scientific institutions of the Colony derive so much strength and direction from the work done at the older centres of learning, that no review of our progress is, I conceive, adequately represented without some reference to the general progress of human knowledge.

If, in referring to the work of our past session I appear to dwell unduly upon some of the subjects which have occupied your attention, I ask you to follow me in regarding them as of more than usual interest and importance, and on that account claiming a more detailed consideration.

During our last session we held eleven ordinary meetings. The papers and the discussions following the reading of them were generally of great interest and importance, doubtless aiding us in our advance in the departments of knowledge to which they belong. By the indefatigable zeal of your honorary secretary, Mr. Thomas H. Rawlings, the whole of the last year's Transactions have been printed, and were placed in your hands shortly after the close of the year, and also distributed to the various learned societies with which we are in communication.

Of the contributions laid before you, two pertain to physical science, three to the natural history of Australia, three to the development of our natural resources, two to pathological science, four to the geology, mineralogy, and palæontology of Australia and New Zealand, one to social science, and two to applied chemistry.

I will first refer to the Rev. J. E. Tenison Wood's paper "On the Glacial Period of Australia," in which he gives his reasons for concluding that "during the Glacial period of Europe our continent and seas have passed through a subtropical climate," or at least a much warmer one than we now experience. He stated, as you well remember, that he did not base his opinion upon the absence of those groovings and striations left by the mighty slip of glaciers and icebergs—for in the northern hemisphere these are not found lower than the 40th parallel of latitude—but rather upon the subtropical character of our tertiary fauna; he concluded his paper by saying, "A true glacial epoch in New Zealand would be a puzzling fact, and very difficult to reconcile with what we see in Australia," and stating his belief that the Australian continent is now passing through a colder period than any of which we can find evidence in its previous geological history. On the same subject, and discussing these views, Dr. Haast, an honorary member of this Society and geologist to the Province of Canterbury, New Zealand, contributed a paper, which was read at the October meeting. Referring to Mr. Wood's paper, he stated that he had traced glacial action over the whole length and breadth of the south island of New Zealand; he does not accept Mr. Wood's conclusion, with respect to the non-existence of evidence indicative of our continent having passed through a glacial period, and points out that if geologists want to find traces of this epoch they must look for it in the Australian Alps, where morainic accumulation may have been preserved around the lakes; but from the small altitude of this chain, he expects these will be of small extent and dimensions.

Mr. Thompson read a paper "On the Formation of Mineral Veins and the Deposit of Metallic Ores and Metals in them," at our October meeting. In the present stage of our knowledge of geological changes, the mode of occurrence of minerals in veins and the formation of the latter, present almost insuperable difficulties to the clear comprehension of them. This subject, although it has taxed the energies of Hopkins, Bischoff, and other superior minds, may be considered as still unsolved. In Mr. Thompson's paper, his conclusions are based upon observations of particular cases, and are thus preferable to geological conceptions of a purely speculative character.

Professor M'Coy, at the February meeting, announced the discovery in Australia of *Enaliosauria* and other cretaceous fossils, thus establishing the fact—of immense geological importance—of the existence of the cretaceous period on the Australian continent.

A description of a fine specimen of rubellite or red tourmalin, found for the first time in Victoria in a mine at Maldon, was read by the Rev. Dr. Bleasdale, at our July meeting.

An account of some bone-caves at Glenorchy, in Tasmania, contributed by Mr. Wintle, of Hobart Town, was also read on the same evening.

Turning to the papers having reference to natural history. At the first meeting of the session, Professor M'Coy described three new species of Victorian birds, and at the September meeting he contributed a paper "On the Species of Wombats," in which he showed us that until very recently only one species of wombat was known to zoologists, The Phascolomys wombat, but that the existence of four species, which he described, may now be considered as demonstrated.

At the meeting in May, an elaborate paper "On the Australian Coleoptera," was presented to the Society by that renowned naturalist, Count de Castelnau. It contains descriptions of a large number of new Australian beetles, and forms a most valuable contribution to entomological science.

Of the two papers which I have classed as pertaining to physical science, one was read at the February meeting, by Mr. G. W. Groves, and was entitled "Contributions to Meteorology." The other was a description of a new self-registering electrometer, which I had the honour of reading at the last meeting of the session. This description referred to an apparatus I had devised and erected at the Observatory, for the purpose of obtaining a continuous record by the help of photography, of the force and variations of atmospheric electricity. Specimens of the photographic curves it produced were also exhibited. You will be glad to hear that after experience of its performance, we have every reason to consider it a most useful addition to the meteorological appliances of the Observatory.

Some valuable contributions, bearing on the development of our natural resources, were read at the April, May, and October meetings, the first of which is "On the Manufacture of Paper from Native Plants," by Mr. Newbery, in which he drew our attention to the importance to be attached to the discovery of raw material suited to paper making, and pointed out that we had several indigenous plants fitted for this purpose growing in considerable profusion on our waste lands; he especially called attention to two grasses, the *Xerotes Longifolio* and a variety of *Lepidosperma*, the fibre of both of which he believed would be of great value for making common paper, and for mixing with rags for white paper. Mr. Newbery's valuable suggestion will, no doubt, be practically tested so soon as the new paper mills on the Yarra commence operations.

The second communication of this class was a paper "On Colonial Wines," by the Rev. Dr. Bleasdale. This placed before you a large amount of practical information respecting our vineyards and the wines produced from them. He gave the results of his chemical inquiries into several samples, and indicated the conditions on which he considered the success of Australian wine-making to depend.

Mr. Newbery's paper "On the Analysis of our Mineral Waters," forms another contribution bearing on our natural resources. The writer gives the analyses he has made of the waters from several of our quartz mines remarkable for containing a large per centage of chloride of potassium, as well as of the Ballan springs, the latter found to contain a large per centage of carbonate of soda, with carbonate of lime and magnesia, with 416 cubic inches per gallon of free carbonic acid. This water, as you are aware, has now come into extensive use under the name of "Ballan Seltzer Water;" it forms a very refreshing and pleasant beverage, and may, no doubt, be medicinally useful in some cases.

At the June meeting, Professor Halford brought before us his paper "On the Appearances of the Blood after Death by Snake Poisoning." At the October meeting also, he contributed some further observations on the same subject.

You will remember that in April last, a gentleman died in Melbourne from the bite of a cobra-di-capella, which he had brought from India, and thought to be fangless. At the *post mortem* examination, Professor Halford, remarking the great fluidity of the blood, examined some under the microscope, when it appeared to him to contain a great number of colourless cells of a larger size than any usually seen in blood. Further examination corroborated this fact; he observed numerous cells much larger than blood corpuscles, with delicate translucent cell-walls, each cell containing one, two, or more nuclei, and also noted a peculiar macula or nipple on the cell wall after the application of magenta dye. He killed a dog with poison taken from the glands of the same cobra, and other animals with poison taken from Australian snakes, and after death in every case the blood was found fluid and full of these cells. By later observations he was led to believe that the growth of these cells commences immediately the poison gets into the blood, and continues to grow even after death; so that twelve hours after death blood taken from an animal that died from the poison in ten minutes, will be in the same stage as regards the cell growth as that taken one hour after death from an animal that survived the poison eleven hours.

Considering the importance of this subject, I make no apology for troubling you with a succinct account of my personal experience concerning Professor Halford's discovery. Some little time since, I had, in company with a friend, a good observer with the microscope, an opportunity of witnessing the progress of this cell growth. A dog bitten by an Australian tiger snake at 9 a.m., died in an hour; at 3 o'clock some blood taken from a vein was dark and quite fluid. Under the microscope the red and white corpuscles appeared normal in size and shape, but were moving about free in the fluid *liquor sanguinis,* and not sticking together in rouleaus, as is usual with healthy blood. Amongst these corpuscles we observed spaces where some apparently structureless granular matter had pushed them aside. An hour after a fresh supply of blood from another vein showed us amongst what appeared to be the same kind of granular matter, large nucleated cells, which we estimated to be from three to four times the diameter of the ordinary red corpuscle; these cells, whose walls were so delicate and translucent that it required most careful management of the light for their definition contained nuclei, some, one, many with two, three, or even more; delicate as they were, however, they became as distinct as the ordinary red corpuscle by the application of a little magenta dye, which did not seem to alter their dimensions in the least by osmotic action. In many of these cells also, the little macula on the cell wall was observed, but not on all. In blood taken from the jugular vein twenty-four hours after death, we observed these cells, now appearing more tense, in immense numbers, and many of the nuclei floating about free, as well as a great quantity of transparent acicular crystals, which magenta dye rendered very distinct.

The existence of cells in the blood of the individual who died from the cobra's poison, different from those found in cases of pyæmia, leucocythæmia, and other diseases, was warmly contested in this Society, and you will remember the animated discussions we had on the subject; but those who have carefully observed the blood in snake-poisoned individuals, cannot, I should imagine, be in the least doubt as to the fact of the presence of these cells. My friend and I were very sceptical on this point, and at first failed to see them, but afterwards we felt no longer any question in our minds either as to their presence or to their size being greater than that of any cells in the blood we had ever witnessed or seen described.

Whether this particular cell-growth is peculiar to snake-poisoned blood, or whether it may be found in the blood after death from other causes, especially in cases where the blood remains fluid, is a question not yet determined, but one that still occupies Professor Halford's attention, and one to which he invites the general attention of microscopists as well worthy of a searching inquiry. He tells us that in most careful observations, repeated very many times, he traces the growth of the cell out of the germinal matter before alluded to; that first the nucleus appears, then the cell wall. This, if established, is an important point, and one upon which many of our greatest physiologists are not agreed. Kolliker and Virchow holding the view that all cell-growth proceeds from pre-existing cells, while Schleiden and Schwāan believed they always grew out of structureless granular matter; Beale, a later authority, working with higher microscopic powers, leans also to this latter view.

Professor Halford considers that snake-poison acts as a kind of ferment in the blood, and that the oxygen which is required to keep it in a condition to support vitality, is used up by the cell-growth, thereby causing the death of the bitten individual. After death we find the dark fluid blood rapidly absorbs oxygen when exposed to the air, and becomes bright in colour; the fibrine has also disappeared, or at all events has become so far degraded by some molecular change as to be no longer coagulable.

Although we may regard these investigations as of the highest importance, not only in their direct reference to the question of snake-poisoning and animal poisons generally, as well as to that cell-growth and the study of the chemistry and physiology of of the blood, yet it must be confessed that the great question of saving from death those bitten by snakes is still an unsolved problem; the light thrown upon the whole subject, however, appears to indicate a path by which the rational treatment of these cases may be arrived at. But little, after all, is known of the functions of the blood or of its connection with nutrition of the tissues and vital force, or of its intricate, chemical, and physical changes in disease; and it is from inquiries of this kind, philosophically conducted, that we must look for progress in this most difficult and at present obscure branch of human knowledge. Such inquiries, however, for their successful pursuit, appear to require not only a knowledge of physiology and pathology, but of the highest chemistry and physics generally—a rare combination to be met with in one individual; and it suggests at once that scientific progress in the treatment of disease will come but slowly, until natural philosophy and chemistry, especially in its dynamical aspect, form as large a part of a medical student's training as even anatomy itself.

Mr. Rusden's paper, "On the Ethics of Opinion,' was read at the September meeting; it treated of how far men are properly liable to blame or praise, reward or punishment, for their thoughts or actions. The novelty of character of this contribution may have given rise to an impression that it was not exactly of a nature included within the objects of the Society: very little consideration must however show, that any attempt to contribute to social improvement, so long as it is regarded in its scientific aspect, may be fairly considered to come within the scope of this Society.

"The Danger of Collision between Vessels crossing one another's Tracks," was the title of a communication from Captain Perry, read to you at the November meeting. In this paper a very simple method of procedure to be adopted by approaching vessels was suggested by the writer, by which danger of collision might in nearly all cases be avoided. The plan suggested consists in the approaching ships ascertaining if the same relative bearings between them continues to be maintained, and if so, to alter their course; for, as was demonstrated by a simple diagram, collision becomes inevitable if the same bearing is maintained. So simple a mode of even lessening the probability of collisions, if not already generally adopted by nautical men, should be well noted.

At the same meeting a paper "On the Purification of Water," was presented by Mr. Dahlke. This related to a method of filtration devised by the writer, by which organic and most mineral impurities, including the salts of lead, were removed from drinking water; brackishness also, by a judicious arrangement of this filtering medium, he stated might be removed to a considerable extent. He exhibited a filter that he had constructed which was partly tested in your presence; the further testing of its properties you will remember was referred to Mr. Newbery, who reported at the next meeting that the filter not only did all that Mr. Dalhke had stated, but he found it to possess powers of filtration beyond anything he had previously known; he had tried it very severely by filtering solutions of salt, sulphate of magnesia, and even sulphate of ammonium with it, and in every case the filtrate passed out as drinkable water, with barely traces of the substance previously in solution. Passing hot water in a reverse way through the filter removed the suspended salts and restored the activity of the filtering medium, which, after continued use, was diminished.

Some experiments were since tried on the filtration of sea-water, by Mr. Dahlke, and I believe he is now engaged in the construction of a large filter for rendering brackish water fit for sheep and cattle at some station on the Darling river. There is no doubt that the kind of filter exhibited is exceedingly successful as an ordinary domestic filter, but whether it will become practically successful in so remarkable a use as that of removing salt from sea or very brackish waters, is not yet demonstrated.

I congratulate you upon these results of your past session, and I regard them as an evidence of increasing activity and an earnest of advancement in the objects of this Society.

You will be glad to learn that our intercourse with kindred societies has increased; there are now eighty-six learned bodies with which we are in communication and interchange of publications; forty-one of these are British, thirty-six Continental European, five American, two Asiatic, and five Colonial. Our library has been considerably increased by donations from these societies, and a complete catalogue, compiled by your honorary librarian, Dr. Neild, is appended to the second part of the last volume of our Transactions.

I would now revert to the year's history and present state of our public scientific departments, and in doing so if I speak at more length of matters concerning our Observatory than of the other institutions, it is only because I am better acquainted with the details of its progress.

In my last address I told you that the Great Southern

Telescope, which by-the-bye is now to be styled the *Great Melbourne Telescope,* was approaching completion, and its arrival might be expected in the course of a few months. It has, however, not yet reached us. Several unlooked for delays in its construction occurred, principally owing to the determination on the part of the manufacturer, Mr. Grubb, that nothing but the very highest excellence in all its parts should go to its construction.

Many of you, no doubt, read the interesting letter of Dr. Robinson, of Armagh, which appeared in the daily papers a week or two since, respecting his inspection and trial of this great instrument, and that he passes a high eulogium on the excellence of its mechanical details, as well as of its optical powers, so far as he was enabled to judge from the imperfect trial he had with it in this respect. We are expecting every mail to hear of its shipment, and there appears to be every probability of its being even now on its way. M. Le Sueur, a gentleman selected by the committee as an observer for this telescope, comes out with it, and will occupy the position of second assistant-astronomer at the Observatory. Of this gentleman's high qualifications for the work before him we have the best testimony. You are aware, no doubt, that apparatus for celestial photography and spectrum analysis of the light of the heavenly bodies will form part of the appliances of this gigantic instrument, and I trust that Dr. Robinson's hope, "that an inestimable harvest of discovery and triumph will crown this magnificent enterprise," will be fully realised. I have obtained a few photographs of a lithograph of the Great Melbourne Telescope, which will be handed to you at the conclusion of this address.

It appears that some kind of a building with movable roof will be necessary to protect it from the great damage likely to arise, if exposed to the dust-storms we are liable to;

it is therefore proposed to erect a circular building, with a revolving roof, and Parliament will be asked for a vote for this purpose. A small extension of the Observatory ground has been granted, thus enabling the telescope to be erected in a position where it will command a full view of the heavens without creating any disturbance on our magnetic instruments by its too close proximity.

You will remember that in my last address I mentioned that a complete set of self-registering magnetic instruments or magnetographs (similar to those used at Kew) were expected to arrive shortly. These duly arrived, they have been erected and at work since November last, producing an uninterrupted photographic record of all changes of the forces of terrestrial magnetism.

A wet and dry bulb thermometer and barometer, continuously self-registering, on the same principle, are now being constructed for us, and will probably be at work in the course of a few months. The results likely to be obtained from the adoption of self-registering instruments of this kind can scarcely be too highly estimated, for the periodic method of observing phenomena that are changing continuously, could never satisfactorily admit of those close deductions being made requisite to derive any practical value from the observations. Variations of the forces measured sufficient to establish or overthrow a supposed law may, and doubtless do, often happen in the intervals between intermittent observation, which, by the photographic or other self-registering method, is indelibly recorded with true relations to preceding and following variations.

The Melbourne portion of the survey of the southern heavens has made considerable progress; the portion of the heavens lying between the 150° 40′ and 152° 46′ parallels of declination have been thoroughly surveyed, and the positions of 19,600 stars established.

A series of observations for the determination of the difference of longitude between Melbourne and Adelaide by aid of the Electric Telegraph, was made at the latter part of last year, and although the result is considered not quite conclusive, as it is intended to make another series of comparisons, it may however be accepted as nearly the truth, and makes the difference of longitude 25m. 33·78s. assuming the longitude of Melbourne to be correct, that of Adelaide would be 9h. 14m. 21·02s.

Before leaving the subject of our astronomical labours, I would add a word concerning the total eclipse of the sun, which will take place on the 17th of August, this year.

The eclipse will be a most remarkable one, and unrivalled by any recorded in the annals of mankind in its magnitude and duration. At its commencement the moon will be unusually near the earth, and at the same time reaches the ascending node of her orbit. The sun also reaches nearly the zenith of those places where the eclipse takes place at noon; the augmentation of the moon's apparent diameter, due to her altitude is a maximum; a combination of circumstances resulting in the apparent diameter of the moon exceeding that of the sun by an unusual amount, and in the time during which the sun will remain eclipsed, being almost unprecedented.

The greatest length of totality will occur in longitude 102° 38′ E. and 10° 28′ N. in the Gulph of Siam, where it it lasts 6m. 50sec. The path of totality, which commences at sunrise in Abyssinia, passes over the Straits of Babel Mandeb, Aden, Arabia, through India between Goa and Rajapoor, across the Gulph of Siam, where the greatest phase occurs—then through Borneo, the whole of the South of New Guinea, ending at sunset about the New Hebrides.

So unusual an eclipse as this is sufficient to put astronomers on the *qui vive,* for such an one has probably never been seen by man, and none of such magnitude is likely ever to be witnessed by any now living. But there are, however, higher objects than this in view, and great preparations are being made to carry out investigations concerning the sun's atmosphere, which can only be attempted during total eclipses, and for which this one offers so long a period of totality. It has long been supposed that an atmosphere surrounds the sun's exterior to the photosphere. Those remarkable red clouds or prominences and the corona or glory with its projections, generally seen in total eclipses, and especially in that of 1860, all point to this. These luminous clouds were found by Mr. De la Rue to have great photographic power, and Mr. Brayley concludes therefrom that they probably consist of incandescent globules of metal in a liquid state, or perhaps of solid particles of the metals discovered in the sun by Kirchoff. The optical means of analysing the light from various sources have been so much improved since the last total eclipse witnessed by astronomers in 1860, and our increased knowledge of the physical conditions of the sun, as well as of many other of the heavenly bodies, induces the scientific world to confidently hope that the telescope, spectroscope, and heliograph will reap rich harvests in the hands of the many experienced observers who will be engaged in the path of totality.

The Botanical department, so efficiently conducted by your fellow member, Dr. F. Mueller, has not been idle. The "Fragmenta Phytographa Australis," I am informed, will have reached the completion of the sixth volume next month. Dr. Bentham's new work on the Australian Flora (to which Dr. Mueller contributes largely) is progressing rapidly; the fourth volume containing the Candollian division—Corolliflora—is nearly complete; the fifth volume, which it is expected will be issued next year, will contain the Monochlamydea; and it is intended to follow it up by a sixth volume, containing the Monocotyledons and Ferns. A supplementary volume will afterwards be probably issued, to comprise the newer discoveries amongst cotyledonous plants, for which the "Fragmenta" will afford the principal records. This book will be the most complete descriptive work on the vegetation of Australia, and with which, in its completeness, no similar work on European vegetation can compare. You will be glad to learn that the Cinchona (Peruvian bark) plants are prospering. Dr. Mueller informs me they have been exposed to extremes of temperature, varying from 30° Fahr. last winter, to 100° Fahr. during this summer, in an artificial fern gully in the gardens without injury; this gives ample testimony of their hardihood, and their fitness for coping with the much smaller vicissitudes they would be liable to in the sheltered gullies of our mountain ranges. The establishment of this most valuable plant is of the utmost importance, and in a commercial point of view can scarcely be over-estimated. There are now in the garden nurseries a large number of plants of cork oaks, Western Australia mahogany, tea, tobacco, coffee, and other prominently useful plants, ready for planting in the valleys of the Upper Yarra this autumn.

Dr. Mueller made a botanical visit to Western Australia during last year, and he informs me his principal object was to connect the observations of the flora of that colony with geological formation, in continuation of the many facts he had traced out in other parts of Australia. An investigation of the mutual relations existing between vegetation and geological formations is of great importance as bearing on the general question of the occupation of the soil for various purposes of culture.

The Phyto-chemical laboratory under Dr. Mueller's direction is still engaged in researches into the technological, medicinal, and other properties of the Australian vegetation, and especially as regards the amount of potash in our trees, which he states has already afforded highly satisfactory results. The question of the yield of iodine and bromine in our large sea weeds is also occupying the attention of this branch of the botanical department.

Our National Museum, under the management of Professor M'Coy, continues to increase in its usefulness. It was highly praised by the naturalists and officers of the Italian Scientific Expedition, who visited us in the *Magenta,* and who were fresh from the study of the best zoological collections in Europe. Our member, Mr. Ulrich, too, who has just returned from an inspection of the principal mining schools of Europe, finds them exceeded by the mining section of our museum, prepared by Professor M'Coy with the object of facilitating the establishment of a School of Mines in the colony by taking advantage of the proximity of the National Museum to the University, in which eight out of the ten courses of lectures required are already given. The natural history specimens mounted eight or ten years ago still maintain their freshness and state of preservation, which is, no doubt, in a great measure attributable to the fact that the Museum is surrounded by the well-planted University grounds, where it is free from the destructive influence of dust and smoke. Various classes of the University students make daily use of the different sections of the Museum, while the number of the general public who visited this institution during the year amounted to 68,000.

Amongst the most interesting colonial specimens added during the year is the great skeleton of a new species of whalebone whale (*Physalus Grayi,* M'Coy), which is now beautifully articulated, and placed outside the west wall of the Museum. This specimen is 90 feet long. Next to this in interest are the further donations of Mr. Carson, of

Eualiosaurian fossil reptiles from the Flinders, to be described in our proceedings as bearing out the views already laid before this Society concerning the occurrence of these fossils in Australia. A very large iron meteorite, from Cranbourne, weighing thirty cwt., has been placed in the Museum, which Professor M'Coy promises to describe to us at an early meeting. Considerable additions, illustrative of foreign natural history, have been made, and the conchological collection, which is of great extent, is now almost completely named.

The geological collection is also largely increased, as well as that of the different *articulata* ; but it appears that there is no more room at present in the half of the Museum already built for their display.

From the report of the Government geologist, Mr. Selwyn, just published, we are put in possession of the progress made in the geological survey of the colony. It appears that fifty-five quarto sheets, each of which contains the geological features of fifty-four square miles, have already been published, and that eleven are ready for the engraver. A collection of 1248 geological specimens has been arranged and labelled for the National Museum. Besides the strategraphical arrangement of these specimens, each is labelled with numbers and letters, indicating its locality and the map to which it belongs. Considerable additions to the geological sketch-map of the colony have also been made by the director, from his reconnoissance surveys in various districts. The department, however, has been singularly crippled during the past year, owing to the absence of some of the officers on leave, and the sickness of others. The survey has, nevertheless, made considerable progress, especially in the districts of south Ballarat and north of Creswick and Clunes. It appears that a party has been engaged in the first-named locality on a research into the course and limits of "*deep leads*" of the Ballarat gold-field, which has already resulted in Mr. Murray, the gentleman engaged in this portion of the survey, being enabled to indicate the existence of payable gold deposits in a locality where, though frequently traversed by miners, no workings had been established.

In contemplating the more interesting facts that have marked the progress of science in Europe, our attention is attracted by a recent discovery of paramount significance.

In the spectra of many of the fixed stars the lines proper to hydrogen have been observed, and in the outburst of the light of the star T-Coronæ, some time ago, the development of these lines was so conspicuous as to lead to the inference that an outburst of hydrogen, of the nature of a general volcanic eruption, had taken place in this star. Singularly in agreement with these observations are certain results determined by Dr. Graham during his researches on the occlusion of gases by metals.

This exact chemist has shown that the different metals have properties of their own of condensing the various gases, and concealing or occluding them within their substance. In the case of meteoric iron, he has found that it is not only charged with occluded gases, but that the gases thus enclosed are different in kind from those concealed in iron of telluric origin. Common iron bears the impress of the mode by which it has been manufactured in the large proportion of carbonic oxide and carbonic acid as constituents of the gases stored between its particles: whereas, on the other hand, the iron of the Lenarto Meteorite has yielded abundance of hydrogen gas almost entirely free from gaseous carbon compounds.

On these results, Dr. Graham remarks, "The iron of Lenarto has, no doubt, come from an atmosphere in which hydrogen greatly prevailed. The meteorite may be looked upon as holding imprisoned within it, and bearing to us, hydrogen from the stars." Speaking of the amount of gas given up by this meteoric iron being three times the amount found in iron of telluric origin, he further says, "The inference is that this meteorite has been extruded from a dense atmosphere of hydrogen gas, for which we must look beyond the light cometary matter floating about within the limits of the solar system."

A few years ago results of this kind would have been deemed almost beyond the hopes of even the most sanguine philosophers. Dr. Graham presents to us in a tangible form the hydrogen brought from remote regions of space to which possibly our most powerful telescopes have yet failed to reach. He demonstrates that it must have come from a dense atmosphere of the gas found; and, what is of still higher interest, his experiments conduce towards the view, that the so-called chemical elements of our world are so framed as to adapt them to uses throughout the entire scheme of nature.

In conclusion, I will for a moment return to the affairs of the Society. There seems to be every prospect of steady progress. I am rejoiced to see the members earnestly following up the objects for which this institution was intended. Our efforts, whether they have for their aim the investigation of the laws of nature, the development of our natural resources, or the alleviation of the sufferings of our fellow-creatures, although, perhaps, crowned with only partial success, have each the effect of promoting our advancement as a people, and of raising the estimate of the intellectual status of this colony in the minds of the intelligent in other parts of the world. In these days no apology for scientific experiment is required, for although the primary object of science is the discovery of truth, it is now universally admitted that the contributions applied to the arts of life are among the most valued means by which our civilization is advanced. In a new country the problem of the utilisation of its resources opens the widest opportunities for the adaptations of science to practical requirements. An example will illustrate this general assertion: let us for a moment consider our relation with the older countries in reference to the supply and demand of the one important item of animal food. We have inexhaustible means of supply, while in European countries flesh food is becoming yearly scarcer. Any improved method of animal food preservation, assisting its transport, would be a vast accession to our means of wealth, and to this end the facts of chemistry in relation to physiology appear as affording the proper key. The case of food supply is by no means a solitary instance; the same reasoning applies generally to the natural resources of a new and extensive country like Australia.

In these and like considerations let us hope that a sufficient stimulus for our best efforts will be recognized, and that our endeavours will be so far fruitful as to entitle the Royal Society of Victoria to rank in due time with similar older institutions in Europe and America.